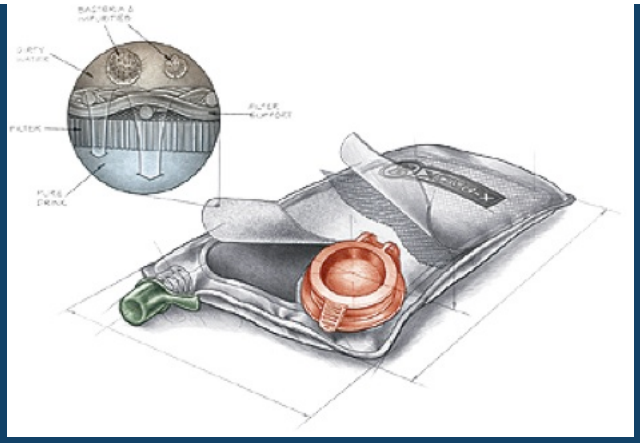


Membrane Based Habitat Wall Architectures for Life Support and Evolving Structures

Habitat Water Wall for Water, Solids, Air Recycle and Reuse

NASA Ames Research Center

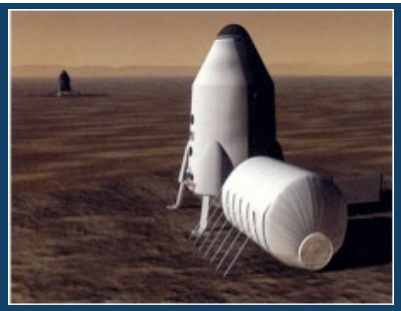
Introduction
What is Water Wall?

The membrane water wall concept proposes a system for membrane based water, solids and air treatment functions that is embedded into the walls of inflatable or rigid habitat structure.

It provides novel and potentially game changing mass reuse and structural advantages over current mechanical life support hardware.

It also provides radiation protection, building materials and structural elements.

Benefits



This approach potentially reduces the cost of human space flight by replacing the mass, power, and volume of conventional life support hardware.

It removes air, water, and waste treatment hardware from the usable habitat volume.

Provides a mechanism to recover and reuse water and waste treatment residuals (solids).

It provides structural elements to strengthen the habitat shell, provide thermal control, and provide radiation shielding.

Statement of Work

This study provides the first evaluation of this concept.

It focuses primarily on water and solids treatment.

Sizing calculation and process concepts are developed for this application.

Experimental work is provided that focuses on evaluating the performance of passive membrane based forward osmosis treatment of wastewater and dewatering of solid and brine wastes.

Air treatment is addressed from a theoretical perspective.

Thermal, radiation, and structural analysis is left for definition in future studies.